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Herbarium

H A N D B O O K TO THE *Ferns of New Zealand.*

CHAPTER I.

EXPLANATORY.

ALTHOUGH the ferns of New Zealand have long been proverbial for their beauty and variety, no work has yet been published professing to treat of them alone. They have been classified and described by Dr. Hooker in his "*Flora Novæ Zealandiæ*," and they are also mentioned in several books on ferns, but these works are too voluminous and expensive to suit the means of many, so that whilst the collection and preservation of these beautiful plants has become a popular amusement, few can name or classify their specimens. The following pages have been written with the desire, in some measure, to supply the means by which those who at present collect ferns without any knowledge of their botanical names may add to the pleasure of their pursuit by the systematic arrangement of their acquisitions: The use of scientific terms has been, as far as possible, avoided, and complete botanical descriptions must not be sought for in this pamphlet, but no term hitherto found in the Islands has been left unmentioned, and it is hoped that the characteristics given of each will be sufficient to enable the enquirer to identify and arrange them.

It will perhaps be well to commence our subject by finding out the place that ferns take in the entire system of botanical classification, and their relation to the rest of the vegetable world.

De Candolle distributes all plants into three great classes,—Exogens, Endogens, and Acrogens; plants belonging to the last of these classes have no wood, or wood having a sinuous structure, no flowers, and bear reproductive organs called spores. Acrogens again are divided into sub-classes Foliacæ and Aphyllæ, the first comprehending those that have, the second those that have not, distinct stem and leaves, and in the first of these sub-classes we shall find the natural order Filices (Ferns) with this essential character:—A distinct stem and leaves, the latter usually divided into numerous pieces, and marked with veins either simple, forked, or anatomosing. Vernation circinate. Reproductive organs either upon the back or margin of ordinary leaves or wrapped up in, or covering separate and contracted leaves.

Thus we arrive at a clear definition of our subject and find that, of the three great classes that comprehend all plants from the most stately tree to the minutest sea-weed, ferns belong to the third; and further that they form the first Natural Order in

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the first of the two sub-classes into which Acrogens are divided. The number of known living species of ferns has been estimated at 2,000, and of fossil ferns there are some hundreds already known of species entirely distinct from those now existing. Of these it may be added for the information of any one who may be travelling in that direction that Dr. Hochstetter mentions "a locality on the West Coast, about 7 miles south of Waikato Heads, where beautiful fossil ferns are imbedded in grey argillaceous strata alternating with sandstone layers and small coal-seams."

The distribution of species is remarkably wide, and this, as well as another fact, to be hereafter mentioned has led to great confusion of nomenclature. Thus, a local botanist, finding a fern new to him, bestows upon it a name and when it has gained some currency, it perhaps falls into the hands of one better informed on the subject, who forthwith shows the plant to be one which has already received two or three names from presumed discoverers in various parts of the world. In this manner,* one of the New Zealand ferns has received no less than eight different names! Dr. Hooker comprises 117 species in his *Flora Novæ Zealandiæ*, of which he says, 30 are of such wide distribution that they may be termed cosmopolitan or mundane; 30 inhabit South America; 61 Australia and Tasmania; 10 are European; several which are not known to be natives of Australia or America, have been found in the lofty mountains of Java; and others in South America. Still he gives 42 as peculiar to New Zealand, although it is not unlikely that they may yet be found common to other parts of the world. Since the publication of his work several other species have been discovered in these islands.

Before proceeding further, it will be necessary to become acquainted with the names of the various parts of ferns; and also with a few botanical terms, the use of which we have been unable altogether to avoid. The *rhizome* is the underground rooting stem; the *stipes* is the stalk from the ground up to the commencement of the leafy part; the continuation of this stalk is called the *rachis*; the principal veins branching from the rachis are *costæ* and those branching again from the latter are termed *costules*, *veins*, or *veinlets*; rhizome, stipes, rachis, costæ and costules forming as it were the skeleton of the fern. When the veins do not branch they are *simple*; when they branch and the branches do not meet or run into one another they are *forked* and *free*; when they branch and unite again so as to form a network they are *anastomosing*; in such case the spaces between the veins, within their meshes, if we may so speak, are termed *areoles*. The whole leaf is called a *frond*, its primary divisions are *pinnæ*; and

**Pteris incisæ*, Dr. Hooker describes it as *P. Vespertilionis*, but we have given the former name in accordance with a work more recently published by Sir William J. Hooker, who decides that it is the oldest name of the eight.

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when the pinnæ have distinct leaflets these are *pinnules*: *segments* and *lobes* are terms indifferently applied to the projecting parts of notched fronds, pinnæ, and pinnules; the recess between lobes is a *sinus*. A frond is *pinnate* when its pinnæ are quite separate from each other; when they unite before reaching the rachis: the frond is *pinnatifid*; *bi-tri-pinnate* and *bi-tri-pinnatifid* are terms applied to fronds which are thus divided twice or thrice, their pinnæ and pinnules being more or less deeply cut in like manner with the frond itself: when a frond has neither pinnæ nor pinnules it is *simple*. Each of the little masses of fructification* is a *sorus*, and generally consists of a number of *capsules* which in their turn contain *spores*—the microscopic reproductive organs. The capsules are sometimes surrounded wholly or in part by an elastic ring or *annulus*, a microscopic feature in most ferns; but in others, especially in some of the tree-ferns, distinctly visible with the aid of a pocket lens, and bearing the appearance of a spiral wire spring of exceeding fineness and beauty. In some species the capsules are placed on a *receptacle* elevated from the surface of the frond, and they have also in many cases a covering which varies in form and substance, and is called an *involucre* ‡ when this is wanting the sorus is said to be *naked*. By means of the growth, arrangement, and absence or presence, of these different parts, the order Filices has been divided into *tribes*, *genera* and *species*: a gradually narrowing circle, one tribe often containing many genera; each genus, many species; and great variation even being sometimes observable between individuals of a species. To this last point we would particularly draw the attention of our readers: each species is generally supposed, (although there is great difference of opinion upon the subject,) to have proceeded from its own parent plant, but often, from difference of climate, soil, or situation, individuals of a species vary considerably; so that when ferns, although apparently very different, are apt to revert to one original type; or when specimens have been found which by a series of extremely close links unite each other to some particular species, they are only considered *varieties* as they may well be referred to a common parent plant. Many ferns varying in this way have received names as new species; and one only partially acquainted with botany is very apt to make this mistake, as the varieties which complete the chain are often found in far distant localities. Thus, Dr. Hooker observes, that before he could define the characteristics of *Lomaria procera*, “whose varieties to an unpractised eye are more dissimilar than other species of the same genus,” he had to examine many hundred specimens of that plant gathered not only in New Zealand, but in Australia, South Africa, and South America.

* Or seeds.

‡ It should be observed that the *involucra* often fall off or are hidden when the fructification is very fully developed so that specimens with immature as well as mature sori should be examined.

CHAPTER II.

OF TRIBES.

Ferns are divided into tribes principally by the microscopic characteristics of the position and form of the annulus, and the manner in which the capsules burst; we should, nevertheless, recommend any one wishing to find the name of a fern, to commence by trying to refer it to its proper tribe. This may often be done even without the aid of a microscope; thus the tribe *Hymenophylleæ* may always be recognized by the translucent frond, only one of the tribe, amongst those found in New Zealand, failing in this characteristic, and that one having its sorus so evidently projecting beyond the margin of the frond as to leave no doubt to which of the tribes it should be referred. Then again the stalked spikes, (quite distinct from deformed fronds,) of the *Ophioglosseæ* are plain enough, and the *Cyatheæ* may also readily be distinguished, the globose sorus being quite apparent to the naked eye and with the help of a magnifying glass or pocket lens, the elevated receptacle may be plainly seen. Of the other tribes, a beginner, without microscopic aid would be very apt to confound the members; for instance he might not be able to decide whether a fern having naked sorus belongs to the first, the sixth or the fourth tribe. Still something is gained by the enquiry being narrowed to these three tribes; the genera comprehended in them must next be consulted, and here the more particular descriptions will most likely lead to a decision that it belongs to one of two or three genera, even if it cannot with certainty be referred to its own particular genus. Finally the species must be sought, and if due attention be paid to all the little peculiarities of the fern, one description only will be found to suit it exactly. Still it is not improbable that one beforehand totally unacquainted with botany may at first fail in naming a fern; we can only recommend such to persevere, presently they will come to one with more clear characteristics than the rest, they decide without a doubt its name, others that before seemed to tally with that description fall back into their own places and, finding here one and there one, order gradually arises out of confusion.

OF TRIBES.

Tribe I. *Gleicheniaceæ*. Capsules in each sorus 1-6, without stalks, bursting longitudinally, completely surrounded by an oblique or transverse ring. Gen. I.

Tribe II. *Cyatheæ*. Sorus globose, capsules with an incomplete vertical ring, placed on an elevated receptacle, often mixed with jointed hairs. This tribe includes all the tree-ferns of New Zealand. Gen. II—IV.

Tribe III. *Hymenophylleæ*. Sorus at or beyond the margin of the frond, always terminating a vein ; capsules on a thread, or club-shaped often much elongated receptacle, girt with an oblique ring. Fronds very delicate and translucent (except in *Loxsonia*.) Gen. V—VII.

Tribe IV. *Polypodiæ*. Sorus generally on the back of the frond, rounded or linear ; capsules not placed on an elevated receptacle, stalked, partly girt with a vertical ring, bursting transversely on the side where the ring is wanting. This large tribe may be divided into :

Sub-tribe A. Sorus covered with the more or less altered margin of the frond. Gen. VIII.-XIII.

Sub-tribe B. Sorus covered with involucre. Gen. XIV—XXI.

Sub-tribe C. Sorus naked. Gen. XXII.-XXX.

Tribe V. *Schizææ*. Sori arranged in overlapping spikes or on divisions of the frond bent back and altered ; capsules not stalked, striped at the apex as they terminate in a horizontal ring. Gen. XXXI, XXXII.

Tribe VI. *Osmundææ*. Sori naked ; capsules stalked, with a broad, dorsal, incomplete ring bursting lengthwise. Gen. XXXIII, XXXIV.

Tribe VII. *Marattiææ*. Capsules without a ring, combined into an oblong or linear mass (sorus) which bursts down the middle. Gen. XXXV.

Tribe VIII. *Ophioglosseæ*. Sori in stalked spikes, distinct from the frond, without a ring, globose, bursting transversely into two valves. Gen. XXXVI, XXXVII.

CHAPTER III.

OF GENERA.

As we descend from the great divisions of our subject to the less, we find much more obvious characteristics by which to guide our enquiries. Instead of having, as in the last chapter, to turn our attention to the capsules and their annulus we find that the generical description is chiefly concerning the shape and position of the sorus, the absence or presence and form of the involucre and the manner in which the veins are arranged, for although other characteristics may be occasionally mentioned, those of fructification and venation are the most important.

TRIBE I.—GLEICHENEACEÆ.

Gen. I.—*Gleichenia*. Sorus naked, although in some of the species the margin is so curled back as almost to conceal it. The ferns of this genus are stiff and leathery in texture; stipes erect, stiff, generally very tall and slender; the frond branches dichotomously,—that is, divides at one point into two which branches in their turn divide in like manner, often bending gracefully on either side. 4 Species. This genus is divided into two sections:

§ 1.—*Eugleichenia*. Sorus at the point of a veinlet. Segments of the pinnæ very narrow and notched. Sp. 1, 2.

§ 2.—*Mertensia*. Sorus at the middle or angle of a veinlet. Segments of the pinnæ with even edges. Sp. 3, 4.

TRIBE II.—CYATHEÆ.

Gen. II.—*Cyathea*. Sorus on the back of the frond, removed from the margin, although when very ripe the whole of the back of the frond is sometimes covered by the mass of fructification. Involucre globose, at first closed but when ripe bursting irregularly

TRIBE II—III. GEN. III—VI.

either at the base or apex and forming a kind of cup whence this genus takes its name. A large genus of tree-ferns. 4 Species.

Gen. III. *Alsophila*. Sorus on the back of the frond ; receptacle prominent ; no involucre ; trunk generally arborescent, but in the New Zealand species often absent. 1 Species.

Gen. IV. *Dicksonia*. Sorus near the edge of the frond ; globose, on an elevated receptacle, involucre two-valved, the "true" one springing from the point of a vein and often very inconspicuous, the "false" one formed of a lobe of the pinnule turned back and covering the other. Having generally an arborescent stem. 3 Species.

TRIBE III.—HYMENOPHYLLÆ.

Gen. V. *Hymenophyllum*. Sorus marginal ; the receptacle on which the capsules are arranged is either immersed in the edge of the frond or protruded beyond it. The cup-shaped or boxlike, often flattened, involucre is formed of the substance of the frond, the outer edges of the valves do not unite ; the involucre is sometimes produced beyond the edge of the frond and stalked. These ferns are almost always to be found in damp forests and are easily recognized by their delicate, pellucid, bright green fronds in which only two genera at all resemble them. 15 Species, which may be divided into :

§ A. Fronds quite smooth ; margins toothed like a saw but without hairs. Species 1—5.

§ B. Fronds smooth or with the costa and rachis only hairy ; margins not toothed. Species 6—13.

*a. Fronds pinnatifid, rarely pinnate below ; the rachis, and generally the stipes having a margin of the texture of the frond. Species 6—10.

*b. Frond pinnate below, stipes and lower part of rachis without the fine margin. Species 11—13.

§ C. Costa, margins and sometimes the surface of the frond clothed with hairs, which, when closely observed, may be seen to radiate in little bunches from various points. Species 14, 15.

Gen. VI. *Trichomanes*. Sorus marginal ; involucre tubular, of the same texture as the frond, narrowed at the base, widening at the apex ; the receptacle often protruding like a hair. This is a more tropical genus than *Hymenophyllum* from which it may be distinguished by the tubular or trumpet-shaped involucre which is less obviously two-lipped, often quite circular at the mouth, and

TRIBE II—IV. GEN. VII—XII.

also by the protruding thread like-receptacle. Fronds generally delicate and pellucid. 6 Species.

Gen. VII. *Loxsonia*. Sorus marginal, situated in the angles of the notched pinnæ ; involucre thick in texture as is the frond ; receptacle protruded ; capsules crowded upon it and mixed with jointed hairs. 1 Species.

TRIBE IV.—POLYPODIEÆ.

SUB-TRIBE A.

Gen. VIII. *Adiantum*. Sorus marginal, dotlike ; involucre membranous, kidneyshaped, formed of the edge of the frond turned back and bearing the capsules on its under surface, its surface is veined, the veins being continuous with those of the pinnules. 6 Species.

Gen. IX. *Hypolepis*. Sorus dot-like, marginal, separate ; involucre springing at its point from a vein formed of a recurved lobe, but sometimes the margin is so slightly bent back that the sorus is really naked. In habit and general appearance this genus differs widely from the preceding one, which may always be recognized by its marginal, kidney-shaped, involucre. 3 Species.

Gen. X. *Cheilanthes*. Sorus marginal ; the capsules very numerous and prominent, often covering the small pinnules ; involucre as in *Hypolepis*, except that, instead of isolated teeth or lobes of the pinnules, larger portions of the margin are bent back over the sori, forming, in a greater or less degree, a continuous involucre. The only New Zealand representative of this genus is much smaller and more insignificant than those of *Hypolepis*, as will be seen on reference to the species. 1 Species.

Gen. XI. *Pellea*. Sorus line-like or oblong, marginal, growing towards the end of the simple or forked veins, at length forming one mass, a continued, more or less broad, marginal line of fructification ; involucre narrow, continuous, formed of the membranous edge of the frond at first turned back and at length frequently spread open so as to expose the entire fructification. Both the New Zealand species are pinnate. This genus is included in *Pteris* by Dr. Hooker, but in a more recent work by Sir William J. Hooker it has been separated on account of the difference in the position of the capsules. 2 Species.

Gen. XII. *Pteris*. Sorus line-like, marginal, continuous, capsules inserted in the groove between the frond and the involucre ; the latter marginal, continuous, having a dry shrivelled appearance. 6 Species, which may be divided into :

TRIBE IV. GEN. XIII—XVII.

§. Eupteris. Veins forked, free. Species 1—3.

§. Litobrochia. Veins more or less anastomosing. Species 4—6.

Gen. XIII. Lomaria. Sori on a separate frond, capsules finally covering the whole surface of the narrow pinnæ ; involucre marginal, continuous, thin and shrivelled ; sometimes reaching to the costa, but when the fructification is ripe often very inconspicuous. The fronds generally growing in tufts, the central ones bearing fructification, the rest barren. 13 Species, which may be thus divided :

§ A. Sterile fronds, pinnate, having their pinnæ stalked. Species 1—3.

§ B. Pinnæ of barren fronds not stalked but joined by a more or less broad base to the rachis. Species 4—12.

§ C. Frond bi-pinnatifid. Species 13.

SUB-TRIBE B.

Gen. XIV. Davallia. Sorus marginal, oval or circular ; involucre rising from the point of a vein, joined to the back of the frond by its base or by its base and sides. 1 Species.

Gen. XV. Cystopteris. Sorus on the back of the frond in the middle of a veinlet ; involucre nearly circular but attached by a broad base to the sorus ; veins forked and free. 1 Species.

Gen. XVI. Lindsea. Sorus linear, on or just within the margin, tipping with a line of fructification each of the little pinnules ; involucre opening outwards, formed of two plates, the upper one of the same texture as the frond and formed of it, the lower membranous and rising from the ends of the veins. 2 Species.

Gen. XVII. Asplenium. This genus is distinguished by bearing on the back of the frond linear sori, covered by a linear involucre which is attached lengthwise to a veinlet, opening lengthwise and inwards ; sometimes the fronds are cut or divided between every veinlet, when the sori become marginal and the involucre appear to open outwards, but if the whole pinnæ be carefully regarded, it will be seen that the involucre really opens towards its costa. 9 Species which may be divided into :

§ A. Fronds simply pinnate, pinnæ toothed. In one species the lower pinnæ are sometimes pinnate. Species 1—4.

§ B. Fronds bi-pinnatifid, bi-tri-pinnate, sometimes divided into many long narrow pinnules, when the sori become marginal. Species 5—8.

TRIBE IV. GEN. XVIII—XXVII

§. *Allantodis*. Involucre membranous, arched, both margins attached to the vein. Species 9.

Gen. XVIII. *Doodia*. Sori short, linear or crescent-shaped on the back of the frond and forming a row on each side of the costa and parallel to it. Involucre linear, opening towards the costa and parallel to it, placed on an arching veinlet that joins two veins. 1 Species.

Gen. XIX. *Polystichum*. Sori placed on the middle of the veins at the back of the frond. Involucre circular, attached by its centre to the sorus, its edges free all round. 4 Species.

Gen. XX. *Nephrodium*. Distinguished from *Polystichum* by its involucre being kidney-shaped and attached by the sinus. 5 Species.

Gen. XXI. *Nephrolepis*. Veins forked, very close, sunk in the frond, terminating at some distance from the margin, a large joint, twice forked, the upper and shorter joint terminating in a sorus. Involucre kidney-shaped. 1 Species.

SUB-TRIBE C.

Gen. XXII. *Goniopteris*. Sori round, naked and numerous, placed on the middle of each veinlet ; veinlets in each lobe free, but those nearest the costa meet those of the next lobe at an angle, 1 Species.

Gen. XXIII. *Polypodium*. Sori round, naked, placed on the middle of a veinlet ; veins forked and free, never uniting again as in *Goniopteris*. 3 Species.

Gen. XXIV. *Phymatodes*. Distinguished by the large, naked sori, partly sunk in the frond, and the anastomosing veins. 2 Species.

Gen. XXV. *Dictymia*. May be recognized by the simple frond which is so thick as to conceal the veins, and by the large, naked sori which are often oval rather than round. 1 Species.

Gen. XXVI. *Arthropteris*. Veins forked, free ; veinlets terminating within the margin ; small, circular, naked sori at the end of the veinlet, forming a single series all round the pinnæ, nearer the margin than the costa. 1 Species.

Gen. XXVII. *Niphobolus*. May at once be known by the thick white scales, covering its under surface and giving it an almost

TRIBE IV—VII. GEN. XXVIII—XXXV.

woolly appearance. Frond simple, leathery. Sori numerous, round, protruding through the white covering. 1 Species.

Gen. XXVIII. *Grammitis*. Sori oblong or linear, naked, in one series on each side of the costa to which they are oblique; veins immersed in the simple frond. 1 Species.

Gen. XXIX. *Gymnogramma*. Sori naked occupying the veins and veinlets, hence often running in lines and forking, or covering the spaces between the veins and forming a mass of fructification. 2 Species.

Gen. XXX. *Notholaena*. The only New Zealand species very much resembles *Cheilanthes tenuifolia*, but may be distinguished by its scaly, hairy frond; sorus marginal, naked, but sometimes partially concealed by the margin of the frond. 1 Species.

TRIBE V.—SCHIZÆEÆ.

Gen. XXXI. *Lygodium*. A remarkable genus of creeping, wiry ferns; fertile and barren fronds differing in form; fertile fronds repeatedly branching dichotomously, the stalk thus dividing three or four times between its point of junction with the stem and its fertile lobes, the leafy part of which is very inconspicuous, being almost concealed by the numerous little spikes of fructification with which they terminate. 1 Species.

Gen. XXXII. *Schizæa*. A very curious genus to be distinguished by the small pinnatifid limb or comb with which each frond or each pinna terminates, and on which the capsules are arranged in two series, partially covered by its incurved margin. Ferns of this genus often have the appearance of withered stalks, with a little brown comb of fructification at the top. 3 Species.

TRIBE VI.—OSMUNDEÆ.

Gen. XXXIII. *Leptopteris*. The New Zealand ferns of this genus are very finely cut, bright green and translucent. Capsules scattered over the back of the frond on the veins. 2 Species.

Gen. XXXIV. *Todea*. May be distinguished from *Leptopteris* by its fronds being very thick in texture. 1 Species.

TRIBE VII.—MARATTIÆÆ.

Gen. XXXV. *Marattia*. Sori of very curious structure placed at the ends of the veins, just within the margin, and consisting of two opposite, parallel, plates which are marked within by transverse

TRIBE VIII. GEN. XXXVI, XXXVII.

gashes, opening into as many cells which contain the spores. These sori have very much the appearance of so many caraway-seeds.
1 Species.

TRIBE VIII.—OPHIOGLOSSEÆ.

Gen. XXXVI. *Ophioglossum*. Frond thick, juicy, simple; fructification on a flattened spike distinct from the barren frond.
1 Species.

Gen. XXXVII. *Botrychium*. Frond thick, juicy, tri-pinnate; fructification in a large, many-spiked cluster at the end of a long erect stalk. 1 Species.

CHAPTER IV.

OF SPECIES.

Having fixed on the first or generic name of a fern chiefly by means of peculiarities in its fructification and venation, we next have to decide on its second or specific name; and for this purpose we must observe many other characteristics such as the shape, size, and texture of the frond, its manner of growth, whether tufted, erect, creeping, or pendulous; the shape of the rhizome, and the presence or absence of scales, hairs, and tubercles. We have endeavoured in the following descriptions to avoid confusing the enquirer by any unnecessary prolixity, and, without pretending to any complete description, to point out in each case some one peculiarity by which the fern may be distinguished from others in the same genus. The habitats are those given by Dr. Hooker or known to more recent collectors; when the name of a district is mentioned a wide range must be allowed.

GEN. I.—GLEICHENIA.—§ EUGLEICHENIA.

1. *G. semi-vestita*. Fronds $1\frac{1}{2}$ to 3 feet high; stipes tall, smooth, cylindrical, often shining below, woolly or chaffy above. Pinnæ shining above, often covered with a light bloom beneath; branches spreading, forked, and pinnate; rachis often chaffy in the young state, smooth in the old.

Var. B. *heciophylla*. The lobes of the pinnæ concave instead of flat. Northern Island; abundant in open fern-land.

2. *G. dicarpa*. Smaller and more slender than the former; the lobes are closed over the capsules like boxes with transverse slits. Foveaux Straits. Lake Taupo.

Var. B. *alpina*. Stunted and very woolly.

§ 2, MERTENSIA.

3. *G. Cunninghamii*. Stipes very stout, about a foot long, grooved down one side, smooth or sometimes covered with large, pale, deciduous scales in which case they are also found on the rachis; branches stout, sometimes in several tiers, curving and branching repeatedly; segments thick in texture, with smooth edges generally quite flat, sometimes a little turned back, with a light bloom on their under surface; capsules generally exposed. Manukau heads. Drury. In thick forests as far South as Queen Charlotte's Sound.

4. *G. flabellata*. A larger plant than *G. Cunninghamii* from which it may be distinguished by its pinnæ being broader in proportion to their length, green on both sides and the quite smooth stipes and rachis. Keri Keri River.

GEN. II.—CYATHEA.

1. *C. medullaris*. A noble tree-fern; trunk 12—14 feet high, rough with the black bases of former fronds; fronds very numerous, thick in texture, deep green above, paler beneath; stipes and rachis covered with little scattered tubercles; sori numerous and, when perfectly ripe, almost covering the under surface of the frond. Common.

2. *C. dealbata*. A tall and graceful tree-fern, easily recognized by the milk-white under-surface of the fronds. Common.

3. *C. Cunninghamii*. Fronds pale green, membranous, pinnæ broad from the length of the pinnules, the lobes of which are toothed; rachis rough with raised points as in *C. medullaris*. It will be observed that the fronds differ from the latter in texture and in the more deeply cut lobes of the pinnules, and from *C. Smithii* in form and also in the rough surface of the rachis. Mountains of East Coast and interior.

4. *C. Smithii*. A beautiful tree-fern discovered by Mr. Colenso; fronds very delicate and beautiful; pinnæ long and narrow; main rachis pale and quite smooth. Mountains of East Coast and Interior. Taranaki. Wellington.

GEN. III.—ALSOPHILA.

1. *A. Colensoi*. A very beautiful, delicate-fronded tree-fern never attaining a height of more than four or five feet, indeed the trunk is often altogether wanting. The young fronds are thickly clothed

with long, weak, rusty-brown, hairs, mixed with scales ; besides which the surface of the frond is covered with a reddish brown down ; the scales and hair are deciduous. This fern will be easily recognised as it is the only member of the genus found in New Zealand ; it is very rare in the Northern Island having hitherto only been found on the Ruahine ranges, but it is abundant at the south of the Middle Island.

GEN. IV.—DICKSONIA.

✓ 1. *D. squarrosa*. A very handsome and abundant tree-fern ; trunk 10–15 feet high, rough with the black bases of fronds ; young stipes clothed with soft, pale brown, wool ; old stipes, rachis, and midribs of the pinnæ, rough with little tubercles. This fern may be easily distinguished from the other species of *Dicksonia* by its stiff texture and dark-coloured rachis.

2. *D. antarctica*. This tree-fern may be known by its trunk which is covered with matted rootlets ; stipes smooth and pale ; rachis and mid-ribs clothed, more or less, with soft, deciduous hairs and a yellowish brown down ; fronds not so stiff as those of *D. squarrosa*. Wellington. Turanga.

3. *D. lanata*. Trunk generally absent, but sometimes found to the height of 4 feet ; stipes clothed at the base with long, soft, silky hairs ; upper part of stipes and main rachis quite smooth and light in colour, but the upper rachis of the pinnæ and pinnules is covered with very short hairs or down ; when in seed the whole under-surface of the frond is covered with sori, the two-valved, box-like, involucre of which are very conspicuous. Bay of Islands. Wangarei. East Coast, and interior of Northern Island.

GEN. V.—HYMENOPHYLLUM.

§ A.

1. *H. Tunbridgense*. A small fern, found throughout the islands, on rocks, and roots of trees ; frond pinnate below ; pinnate or pinnatifid above ; quite smooth ; pinnæ pinnatifid, sharply toothed ; involucre orbicular, compressed, projecting beyond the frond, and having its lips toothed.

Var *B. cupressiforme*. A taller plant sometimes 3½ inches in height with very narrow pinnæ, far apart from each other, and often bending downwards, rendering the involucre very conspicuous.

2. *H. unilaterale*. Hitherto only found on the Ruahine range ; differing from var B of *H. Tunbridgense* only in having involucre, with smooth uncut edges.

3. *H. minimum*. A very small plant, closely allied to the foregoing, but smaller, and having little spines on the back of its involucre, as well as round its margin. Growing on roots of trees, &c. Scarce.

4. *H. multifidum*. Fronds 2-8 inches long, bi-tri-pinnatifid, the rachis having a margin of the texture of the frond; pinnules narrow, long, deeply-toothed; involucre at the base of the pinnae and pinnules; conspicuous, being frequently stalked, and very obviously two-lipped. Abundant throughout the islands,

5. *H. bivalve*. Closely resembling *H. multifidum*, but to be distinguished by its involucre; which grow at the top instead of the base, of the pinnae, and are partly sunk in the frond. Scarce.

§ B. * a.

6. *H. rarum*. A beautiful, little, bright-green fern, 1-8 inches long; found clothing the stems of tree-ferns, and to be readily distinguished by its hair-like stipes, very transparent fronds, and broad short involucre, terminating the pinnules. Common, in forests on the stems of tree-ferns.

7. *H. pulcherrimum*. An extremely handsome fern, 13-18 inches high, attaining its greatest length when pendulous from trees; conspicuous for its stout rachis and stipes, the latter with a fine margin to the base; short rhizome, clothed with dark brown bristles and woolly root fibres. Frond bi-tri-pinnatifid; involucre small for the size of the plant. Ranges of Mount Egmont. Mountains of the East Coast. Comparatively abundant in the Middle Island.

8. *H. dilatatum*. A very beautiful fern of a remarkably brilliant green; it may be distinguished from the last by its long, quite smooth, rhizome; less winged stipes; broader segments, and larger involucre; 6-18 inches high. Abundant in damp forests.

9. *H. crispatum*. May be known by the crisped, or frilly margin to the stipes and rachis; the segments also more or less partaking of this characteristic; fronds 2-8 inches high, bright green; rhizome smooth, creeping. Bay of Islands. East Coast. Near the coal mines, Drury.

10. *H. polyanthos*. Var *B sanguinolentum*. Fronds quite smooth, 2-8 inches high, of a reddish-brown colour, bi-tri-pinnatifid; stipes only winged at the top; involucre generally numerous. The whole plant has a peculiar odour, especially when dry. Abundant.

§ B. * b.

11. *H. demissum*. A very pretty, abundant fern; frond 4-9 inches high, pinnate below, pinnatifid above; pinnae bi-tri-18

pinnatifid; stipes quite smooth, stiff. The pinnate frond distinguishes it from *H. polyanthos*, and the smooth stipes, from *H. scabrum*.

12. *H. scabrum*. Fronds darker coloured; often hanging from trees, and attaining a great length; always to be recognized by the scattered, stiff, deciduous, reddish-brown, hairs, on the stipes and rachis. Bay of Islands. East Coast. Dense forests near Wellington.

13. *H. flabellatum*. A very bright green species, generally found on the trunks of tree-ferns; 2-8 inches long; somewhat resembling *H. demissum*, but distinguished from it by having broad, fan-shaped, lower pinnæ; and light, soft, woolly, hairs at the base of the stipes, and on the rhizome.

§ C.

14. *H. ceruginosum*. Fronds pendulous, 3-10 inches long; the little, branched, reddish, hairs, all over its surface, render this fern unmistakeable. Waikare Lake. Dusky Bay. Wellington.

15. *H. Lyallii*. A very distinct little species; stipes hair-like; frond $\frac{1}{2}$ -2 inches long, fan-shaped; involucre sunk in the apex of the segments; branching hairs round the margins. Thomson's Sound. Middle Island. Huia, Manukau Heads.

GEN. VI.—TRICHOMANES.

1. *T. reniforme*. The simple, bright green, kidney-shaped fronds, with their fringe of fructification, render this species quite easily recognised. Common, but peculiar to New Zealand.

2. *T. humile*. Frond variable in shape, delicate in texture; 1-4 inches long, bi-pinnatifid; involucre sunk in short segments; receptacle generally very long and hair-like. On trunks of trees, &c. It grows in a small cave at the Three Kings.

3. *T. venosum*. Pinnate and brighter in colour, otherwise somewhat resembling *T. humile*; pinnæ pinnate or pinnatifid, often of very irregular length. On wet rocks, trunks of tree-ferns, &c.

4. *T. Colensoi*. Hitherto only found in the dense forests near Waikare Lake. It appears to differ from the two last species in its distant, shortly stalked, pinnæ; and its involucre, which is stalked, instead of being sunk in a segment.

5. *T. strictum*. Fronds densely tufted; stipes and rachis thick and rigid; frond pinnate; pinnæ very finely cut into numerous, very narrow, segments; involucre stalked. This fern is very rare: it has been found in thick forests near the East Coast, also at Dusky Bay, Massacre Bay, and Hokianga.

6. *T. elongatum*. A lurid-green, rigid, tufted species; 4-9 inches high; pinnæ over-lapping each other, pinnate, with toothed

segments ; involucre very numerous, cylindrical, with short lips ; receptacle long, rigid, protruded on the under-side of the frond ; frond frequently covered with moss. Abundant ; on the ground, in deep shade.

GEN. VII.—*LOXSOMA*.

1. *L. Cunninghamii*. Stipes erect, smooth, polished ; frond broadly triangular, 1-2 feet high, thick in texture, tri-pinnate, generally with a whitish under-surface. Scarce. Keri Keri River, Wangarei.

GEN. VIII.—*ADIANTUM*.

1. *A. hispidulum*. May be known by its rough stipes and rachis, and stiff frond ; 6-12 inches high and often dividing at once into two branches, whence the pinnæ spring and spread out like a fan ; pinnules stalked, as are those of all the members of this genus ; olive-green, often reddish when young ; sori numerous on the upper margin of each pinnule, which are close together, often overlapping one another. Northern Island, Bay of Islands to Cook's Straits.

2. *A. affine*. Stipes and rachis slender, glossy, smooth, and black ; frond limp, sparingly branched, sometimes simply pinnate ; pinnæ, dark green, membranous, with a few scattered hairs on their surface ; hairs also on the surface of the involucre, to be seen by the aid of a lens. This fern, which is seldom more than 8 inches high, is found in damp, shady, places.

3. *A. Ethiopicum*. A very beautiful species, of a bright, pale green, colour ; tri-quadrifid, 6-18 inches high ; stipes long, slender, glossy, brown, as are the rachis and threadlike stalks of the pinnules ; sori few ; involucre large, and pale in colour. Open fern land, and under scrub.

4. *A. formosum*. A rare fern, found on the banks of the Manganaitaka River ; at Kaipara ; and at Wangarei. Frond 2-4 feet high, much branched ; rachis and stipes thick ; pinnæ small and numerous ; rachis smooth and shining below, covered with short stiff hairs above ; stipes very black, shining, rough.

5. *A. Cunninghamii*. Fronds 6-18 inches high, sparingly branched, bi-pinnate, perfectly smooth ; rachis and stipes rather stout, black, smooth, and shining ; the under-surface of the pinnules is generally of a paler colour than the upper. Common in the Northern Island.

6. *A. fulvum*. Somewhat resembling the last-named but having very short, close, reddish, hairs on the upper surface, both of the main rachis, and of the pinnæ ; pinnules of the same colour on both sides. From the Bay of Islands to Banks' Peninsula.

GEN. IX, SP. 1.—GEN. XII, SP. 2.

GEN. IX.—HYPOLEPIS.

1. *H. tenuifolia*. A tall, handsome, spreading, fern, 2-5 feet high; frond sometimes 2 feet broad, tri-quadri-pinnate; first branches spreading; secondary, and tertiary, oblong and narrow; pinnules, without stalks, pinnatifid; sori generally two or three on each side of the lobes; rachis yellow-brown, hairy; stipes stout, often sticky, hairy, and rough. Common.

2. *H. Millefolium*. Fronds a span to a foot high, tri-pinnate; pinnules deeply, finely cut; stipes, rachis, and costa, all pale, covered with weak scattered hairs. Shady places near the top of the Ruahine range. Lake Rotoiti, Nelson. Otago.

3. *H. distans*. A very distinct species. Fronds bi-pinnate rigid, wiry; the slender pinnæ in pairs, at some distance from each other, bright green but turning brown when dry; pinnules stalked, lobed; stipes red-brown and, as is the rachis, rough with minute prickles. Rhizome creeping, hairy. Hokianga. Hutt Valley. Manukau Heads, &c.

GEN. X.—CHEILANTHES.

1. *C. tenuifolia*. The only New Zealand species, is starved and dry-looking, generally found growing on rocks, or in very dry places. Fronds 3 inches to a foot long, tri-pinnate; stipes stout, brown, channelled, with a few scattered hairs at the base, otherwise quite smooth; pinnæ yellow-green, tending upwards, small, scattered; pinnules often a mass of fructification.

GEN. XI.—PELLÆA.

1. *P. falcata*. Fronds erect, tufted, 1-3 feet high, narrow, simply pinnate; pinnæ oblong, pointed, rarely having one or two lobes; sori forming a broad band round the pinnæ; rachis stout, shaggy with scales and hairs.

2. *P. rotundifolia*. Very variable in size and often scarcely to be distinguished from *P. falcata*, from which it only differs, in the narrower frond, and broader, more rounded pinnæ; the band of fructification is also not so continuous. Common as far south as Banks' Peninsula.

GEN. XII.—PTERIS. § EUPTERIS.

1. *P. aquilina*. var : *esculenta*. The common fern of the country, generally covering open, uncultivated, land.

2. *P. tremula*. Frond from 1-5 feet high, generally membranous, light green, tri-pinnate and fading quickly when gathered;

always perfectly smooth, rachis and stipes polished ; pinnules long and narrow, joined by a broad base to the pinnæ ; sori continuous round their edges. Sometimes quadri-pinnate, darker in colour, and thick in texture. Abundant throughout the Northern Island.

3. *P. scaberula*. A very pretty and distinct species ; fronds span to 2 feet high, stiff, tri-pinnate ; stipes and rachis stout, and covered with small reddish hairs ; pinnules thick in texture, small, bright green ; sori forming a yellow margin to their under-surface. Abundant as far south as Akaroa.

§ LITOBROCHIA.

4. *P. (Litobrochia) incisa*. Fronds smooth, 2-4 feet high, bi-tri-pinnate, paler beneath than above ; pinnules oblong, uncut, joined by a broad base to the pinnæ. Immature fronds fade quickly, and dry a blackish green, but when mature and soriferous are firm and rigid. Throughout the Islands, not uncommon on the margins of woods.

5. *P. (Litobrochia) macilenta*. Frond 1-5 feet high, bright green, bi-quadri-pinnate ; the upper pinnules are joined by a broad base to the rachis, the lower ones are stalked, scattered, and deeply cut, green on both sides ; stipes pale, shining, smooth, or with a few scattered hairs. Throughout the Northern Island in dark groves. At the North Head, Auckland.

6. *P. (Litobrochia) comans*. A very handsome fern, large, rather dark green, bi-tri-pinnate ; pinnæ and pinnules broad, close together ; tips of the latter, notched. Bay of Islands. Great Barrier. Manukau Harbour.

Although these three ferns are very different in appearance, it is difficult, without the use of technical language, to describe the distinction between them. Perhaps the light under-surface of the first ; the scattered, leaf-like, pinnules of the second ; and the larger, deeper green, and close pinnæ, of the third ; will suffice to distinguish them until all three have been compared, when there can be no difficulty in giving each its right name.

GEN. XIII.—LOMARIA.

§ A.

1. *L. procera*. The most common and abundant of this genus, chiefly found in woods and marshes. Fronds a span to 4 feet high, broad ; stipes generally scaly at the base, rachis generally smooth ; pinnæ of barren fronds long and narrow ; fertile pinnæ sometimes occupying one side of the sterile frond, more often on a separate frond.

Var. A. Base of the sterile pinnæ cut sharply off or almost wedge-shaped.

Var. B. Base of the sterile pinnæ having heart-shaped lobes overlapping the rachis.

Var. C. Sterile pinnæ narrowed at the base.

Var. D. *minor*. Sterile pinnæ very thick in texture, with saw-like edges and scattered, dark, scales on the stipes, rachis, and costa.

2. *L. fluviatilis*. Fronds 8—18 inches high, tufted, very narrow; rachis and stipes, clothed more or less, with spreading scales, which are also often seen on the costæ of the numerous, rounded, sterile pinnæ. Mountainous parts of the Northern Island. Middle and Southern Islands.

3. *L. filiformis*. Creeping up trees often to a great height; barren fronds of two shapes, the lower ones small with rounded pinnæ; upper ones 6 inches to 2 feet long, pinnæ rather long with pointed tips, and saw-like edges; fertile fronds shorter than barren ones, with long, thread-like, pinnæ. Abundant as far South as Banks' Peninsula.

§ B.

4. *L. elongata*. A handsome fern found on the Rimu, Tuka; Mount Egmont; and abundant towards the south of the Middle Island. Fronds 1—3 feet high, broad, deep green, shining; segments long, tending upwards, narrowing to a point, lower part of each segment, running down along the stem to the commencement of the next one; pinnæ of fertile fronds, long, narrow, running into very narrow, pointed, tips; stipes dark, shining, brown, as is also the undersurface of the rachis and costa.

5. *L. discolor*. Generally to be distinguished by the reddish colour of the under surface of the frond; fronds 1—3 feet long; narrowing at each end; tufted on the top of a short, woody, erect, caudex, or trunk; pinnæ very numerous, close, at right angles to the rachis; stipes short, scaly at base; pinnæ of fertile frond often with leafy bases. Abundant.

6. *L. lanceolata*. Fronds 2 inches to 2 feet high; in shape rather like the preceding, but generally much smaller; it may further be distinguished by its fronds being green on both sides, less stiff, and by having the pinnæ of the fertile fronds generally tending upwards. Common.

7. *L. pumila*. Much resembling the preceding but smaller ; pinnæ, not so numerous, or close together ; rather shorter and broader, with more saw-like edges. Common.

8. *L. Alpina*. Very narrow fronds 2—18 inches high ; it has a creeping rhizome ; stipes long and bare ; those of the fertile fronds, nearly twice the length of the others. Mountainous parts of Northern and throughout Middle and Southern Islands.

9. *L. Germainii*. Small and with the pinnæ closely overlapping one another, otherwise much resembling *L. Alpina*. Lately discovered on the mountains between Nelson and the Wairau.

10. *L. Banksii*. To be distinguished by the fronds being pinnatifid nearly to the base ; the fertile fronds much shorter than the barren ; pinnæ of barren fronds, short, rounded, thick in texture and with smooth edges. Bay of Islands. Manukau Harbour, Sugar Loaf Rocks, Taranaki. Middle and Southern Islands.

11. *L. vulcanica*. Frond 4—18 inches long ; somewhat broad, running to a long tail at the tip, but not narrowing below ; pinnæ long, the lowest pair often bending downwards. Tarawera. Turanga. Happy Valley, Nelson. Mountain Ranges, Taranaki.

12. *L. nigra*. The whole plant of a blackish green colour ; barren fronds 4—8 inches long, ending in a large, broad, lobe ; fertile fronds with very narrow, hair-like pinnæ, the terminal one much longer than the rest. Rare. East Coast and Interior. Mountains Ranges, Taranaki.

§ C.

13. *L. Fraseri*. Only found in New Zealand, its bi-pinnatifid frond renders it unmistakable ; fronds generally tufted at the top of a short caudex ; fertile fronds, when mature, of a rich yellow on their undersurface. Northern Island, in woods, Northern part of Middle Island.

SUB-TRIBE B.

GEN. XIV.—DAVALLIA.

1. *D. Novæ Zelandiæ*. A very pretty fern, 1—2 feet high, tri-pinnate ; stipes and rachis, both of the frond and pinnæ, brown and polished ; pinnules very finely cut ; sori numerous. Bay of Islands. Wellington, Forest near Howick.

GEN. XV.—CYSTOPTERIS.

1. *C. fragilis*. Fronds delicate, bright green, tufted, 6—8 inches high, bi-pinnate ; pinnules toothed ; sori scattered ; stipes and rachis light straw-coloured. Lately found south of Nelson.

GEN. XVI.—LINDSEA.

1. *L. linearis*. Easily recognized by its erect, narrow, simply pinnate, fronds ; pinnæ fan-shaped ; often curling up when in seed ; sori continuous along the tips of the pinnæ. Common on dry hills, and under Ti scrub.

2. *L. trichomanoides*. Fronds variable in size and appearance ; sometimes erect, sometimes pendent, when they often attain the length of two feet ; bi-tri-pinnate, bright green ; sori terminating each pinnule ; rachis and stipes brown, slender, stiff and polished. Common. Growing luxuriantly on the bank of the Huia, Manukau Heads.

Var. B. *Lessoni*. Smaller, not so bright in colour or so finely cut.

GEN. XVII.—ASPLENIUM.

§ A.

1. *A. flabellifolium*. May be readily known by its long, narrow, prostrate, or pendulous, frond, with a thread-like continuation of the rachis often rooting again ; pinnæ fan-shaped, sori radiating from their base. Generally found amongst stones and rocks.

2. *A. trichomanes*. Lately found between Nelson and the Wairau. Frond 5—8 inches high, erect, narrow ; stipes and rachis dark, purplish brown, shining ; pinnæ small, roundish, in pairs.

3. *A. obtusatum*. Frond 6—8 inches high, thick and leathery ; pinnæ few, stalked, with rounded tips, generally pale, light green ; rachis and stipes of the colour of the frond ; stipes stiff, compressed, clothed at the base with large, pale scales.

Var. B. *obliquum*. Pinnæ larger, more numerous, darker green and pointed. Throughout the Islands.

4. *A. lucidum*. Fronds large, often two feet and more in length ; pinnæ numerous, shining, stalked, their tips pointed ; sori numerous in long, parallel, oblique lines. This species is closely allied to the last, its larger size, less leathery texture, and shining surface, being its most obvious distinguishing marks. Abundant throughout the Island.

Var. B. *Lyallii*. Frond bi-pinnate, not so large or stiff rachis often very hairy. A very remarkable variety found at Otago and Nelson.

5. *A. polyodon*. A very common and beautiful species. Frond 1—2½ feet long; stipes and rachis brown; hairy; pinnae stalked, much and deeply toothed, and tapering to a fine point; sori numerous, diverging from the rachis in the direction of the veins.

B. Lower pinnae with deep lobes, lobes toothed. Port Nicholson.

§ B.

6. *A. bulbiferum*. A very beautiful and common fern, easily recognized in its most highly developed form, by the germinating bulbs on its pinnules. Fronds bright green, not stiff, 1—3 feet long, bi-pinnate; rachis of the pinnae often winged; pinnules deeply cut. Its varieties are very difficult to define, perhaps the following are the most remarkable.

Var. A. Frond pinnate, pinnae pinnatifid, shining, lower pinnae gradually diminishing in size; no bulbs.

Var. B. *laevum*. Fronds generally pendulous, pinnules deeply divided into segments.

Var. C. *tripinnatum*. Frond erect, very finely and delicately cut.

7. *A. Hookerianum*. Frond tufted, 2—6 inches long, limp, pinnate or bi-pinnate; with small, scattered, branches; pinnules stalked, roundish, notched. Northern and Middle Islands, rather rare. Small bush on the Waimea, Nelson. Banks' Peninsula.

In his Flora Zelandiae Dr. Hooker considers this fern a variety of *A. adiantoides* and gives another var. *Colensoi*, but Sir William J. Hooker unites this last with *A. Richardi*, and considers the former a distinct species.

8. *A. Richardi*. Very rare; fronds 4—6 inches high, rigid, dark green, tufted, bi-pinnate; pinnae stalked; pinnules generally without stalks, crowded, deeply pinnatifid, with oblong, blunt segments; terminal pinnules uniting into one with coarsely notched segments; veins forked, one to each segment, thickening at the end, terminating within the margin. "Southern Island. New River."

Var. B. *Colensoi*. Brighter green, not so stiff, pinnules more or less stalked more deeply and finely pinnatifid. Keri-Keri River. Tuki-Tuki River. Waikare Lake.

9. *A. flaccidum*. Very common and variable, generally pendulous from trees; fronds of a very thick texture and bright

shining green, sori marginal. Dr. Hooker gives the following varieties which, he says, "are connected by innumerable intermediate ones; indeed the most opposite characters are sometimes presented by different parts of the same frond."

Var. A. Fronds pendulous, sparingly divided into distant, lobed, thongs.

Var. B. Fronds pendulous, pinnate; pinnæ stalked, distant, very long.

Var. C. Fronds erect or pendulous; pinnæ more numerous, curved like a scythe, long, narrow, stalked, deeply lobed.

Var. D. Fronds erect, bi-pinnate; pinnules close, shortly stalked, deeply lobed.

§ ALLANTODIA.

10. *A. (Allantodia) *Australis*. One of the most delicate and beautiful ferns in New Zealand; frond very membranous, quite smooth, 1—3 feet high, bi-pinnate; pinnules stalked, deeply pinnatifid; many, short, oblong, or oval sori on each lobe. Northern Island, in damp places in woods; also in a small bush on the banks of the Waimea, Nelson. Rather rare.

A small scented fern belonging to a genus nearly allied to this,—(*Woodwardia*), is to be found in the Wairarapa, about 50 miles from Wellington. It has not yet been found by collectors but the natives have brought in plants for sale. They attach a high value to it on account of the perfume and are said to be anxious to conceal its habitat from Europeans.

GEN. XVIII.—DOODIA.

1. *D. caudata*. Fronds very harsh, 3—18 inches long, pinnate; upper part, pinnatifid, and elongated; pinnæ narrow, sharply toothed.

GEN. XIX.—POLYSTICHUM.

1. *P. coriaceum*. Fronds 6—24 inches high, thick in texture, bi-pinnate, sometimes pinnate, scattered, on a creeping rhizome; sori large, brown, or black; rachis generally with spreading scale-like hairs. Throughout the Island.

2. *P. aristatum*. Frond pinnate, or bi-pinnate, very stiff, tufted; rachis and stipes hairy; lobes of pinnæ terminating in a

**A. Brownii* in Dr. Hooker's Fl. N. Zeland.

GEN. XIX, SPECIES 3. GEN. XX, SPECIES 3.

sharp point, sori very numerous. Common from the Bay of Islands to Banks' Peninsula.

3. *P. hispidum*. Peculiar to New Zealand and abundant throughout the Islands. To be known at once by its finely-cut, tri-quadri-pinnate frond ; 1—3 feet high with long, stiff, spreading, black hairs, on the rachis and stipes.

4. *P. vestitum*. A very handsome fern, with numerous fronds ; 1—3 feet high, stiff, spreading like a crown from the top of a stout rhizome ; fronds bi-pinnate, pinnæ long and narrow ; pinnales short, stalked, and deeply cut ; rachis and stipes densely clothed with large, broad, dark-brown, scales. Mountainous parts of the Northern, and throughout the Middle, and Southern Islands.

A fern has been lately found at Otago which is either a variety of this species or altogether a new one to these Islands. The specimens we have seen are about 7 inches long, bright, light-green bi-pinnate ; thick, but not stiff, in texture ; with numerous, pale brown, narrow, scales ; and numerous sori with very prominent and large involucre ; pinnæ near together, and the upper ones overlapping each other.

GEN. XX.—NEPHRODIIUM.

1. *N. decompositum*. Frond a span to 3 feet high, generally tri-pinnate ; sori small, numerous ; stipes and rachis pale brown ; the former, slender and long, in proportion to the frond ; whole plant smooth.

Var. B. Surface of the frond, stipes, and rachis, downy. Throughout the Northern and Middle Islands, as far south as Banks' Peninsula.

2. *N. velutinum*. It is difficult to draw a line between this and some states of *N. decompositum* ; it is generally a larger plant with a tri-quadri-pinnate frond, very broad at the base ; rachis and stipes red-brown with the down which covers them, and which also gives a soft, velvety, appearance to the whole frond. Abundant throughout the Islands.

3. *N. squamulosum*. Very peculiar looking ; frond light green, perfectly smooth, pinnate, with a remarkably long, slender stipes rising from a prostrate, woody, rhizome ; pinnæ pinnatifid, the segments much narrower in the fertile, than in the barren state, as the edges then curl over. Bay of Islands and East Coast. Swamp at Mangarei.

GEN. XX, SPECIES 4. GEN. XXIII, SPECIES 2.

4. *N. molle*. Fronds 8—18 inches high, dark green, pinnate; terminal pinna much elongated; pinnæ almost at right angles to the rachis, deeply notched; sori numerous all round the lobes and extending to the costa. Rotomahana.

5. Specimens have been sent home of another *Nephrodium*, also found near the Hot Springs, which has not yet received a specific name; it differs from the latter chiefly, in having its pinnæ tending upwards, and in the position of the sori, which are confined to the lobes, and do not extend to the costa.

GEN. XXI.—NEPHROLEPIS.

1. The species found by Dr. Hochstetter is pinnate, about 1 foot long; pinnæ roundish with toothed margins; rachis with scattered, scaly hairs. He thus describes its habitat: "From the same range," (the Pairua, on the eastern side of the Waikato not far from Taupo,) "the warm-water river Waikite takes its origin. On both sides are deep pools of boiling water, on the margins of which we discovered most beautiful ferns, hitherto unknown. These ferns are remarkable not only for their elegance, but also from the peculiar circumstances under which they exist, as they are always surrounded by an atmosphere of steam." Lecture on the Geology of the Province of Auckland, New Zealand.

GEN. XXII.—GONIOPTERIS.

1. *G. pennigera*. A very tall, handsome, pinnate fern; 2—3 feet high; quite smooth; pinnæ long, deeply notched; sori, numerous, small and generally black; this fern often acquires a stout, woody caudex, 6—8 inches high, covered with the bases of old stipes. Common, in shady places as far south as Akaroa.

GEN. XXIII.—POLYPODIUM.

1. *P. rugulosum*. Whole plant more or less covered with a reddish down; a span to 3 feet high. Frond bi-tri-quadri-pinnate, more or less membranous, pinnæ very variable in length; pinnules joined by a broad base, lobed; stipes and rachis generally dark brown, slender, rough to the touch; often hairy; rhizome rigid, woody, creeping, and scaly, sending up distant fronds. Throughout the Islands.

2. *P. sylvaticum*. Exactly resembling *Polystichum vestitum* in growth, form, and texture; and only differing from it in the generic characteristic,—naked sori. Northern Island; mountainous woods, East Coast and Interior. Port Nicholson.

GEN. XXIII, SPECIES 3.—GEN. XXVIII, SPECIES 1.

3. *P. Grammitidis*. Fronds an inch to a span long, tufted, thick in texture; perfectly smooth, with the exception of scales at the base of the stipes; deeply pinnatifid; pinnules somewhat distant, linear, entire or lobed, often irregularly so; sori generally oblong; short stipes winged nearly to the base. Dwarf states have small, linear, lobed, fronds. Throughout the Islands, generally on trunks of trees.

GEN. XXIV.—PHYMATODES.

1. *P. Billardieri*. The two species of this genus may be at once distinguished merely by the rhizome. In the present species it is thick, fleshy, and green, dotted with short brown scales; creeping over trunks of trees, &c., to which it clings by fibrous roots. Fronds varying in shape and size, simple or pinnatifid, 3 inches to 1 foot long, bright green, shining; rachis and costa stout. Abundant throughout the Islands.

2. *P. postulata*. Rhizome creeping over trees, &c., somewhat slender, tough, densely clothed with brown, scale-like, hairs; fronds varying in form, generally narrower than in the last species, more membranous; stipes generally winged. As far South as Akaroa.

GEN. XXV.—DICTYMIA.

1. *D. lanceolata*. Fronds perfectly smooth, simple, narrowed at each end, tufted; roots brown, or black, woolly; sori large, globose, in one series on each side of the costa. Throughout the Northern Island.

GEN. XXVI.—ÆTHROPTERIS.

1. *A. tenella*. A climbing, pinnate fern; rhizome very long, slender, rigid, scaly; fronds scattered, pendulous; pinnæ stalked, narrowed to a point, margins waved. Throughout the Northern Island; climbing lofty trees.

GEN. XXVII.—NIPHOBOLUS.

1. *N. rupestris*. Rhizome creeping, slender, scaly; fronds 1½ to 3 inches long, simple, leathery in texture; almost oval in a barren state; but when fertile much longer and narrower. Abundant on rocks and trees throughout the Islands.

GEN. XXVIII.—GRAMMETIS.

1. *G. australis*. Fronds densely crowded, simple, long, narrow; the oblique, oblong sori at once distinguish this fern. Throughout the Islands.

GEN. XXIX, SPECIES 1. GEN. XXXII, SPECIES 3.

Var. *B. villosa*. Fronds hairy.

Var. *C. alpina*. Fronds $\frac{1}{2}$ inch high, thick, oval; forming dense, moss-like, patches; sori growing in a mass towards the apex of the fronds. Mountains between Nelson and the Wairau.

GEN. XXIX.—GYMNOGRAMMA.

1. *G. rutaeifolia*. Fronds densely tufted, 3—5 inches long, delicate in texture, hairy, pinnate. Pinnæ stalked, wedge or fan-shaped, more or less lobed. Very rare. East Coast; Colenso.

2. *G. leptophylla*. Fronds perfectly smooth, an inch to a span high, membranous and shining, pale green, bi-tri-pinnatifid; stipes and main rachis usually red-brown, brittle, shining, grooved in front. Dry hills on the East Coast. Summit of Mount Wellington.

GEN. XXX.—NOTHOLÆNA.

1. *N. distans*. Fronds densely tufted, 3-10 inches high, rigid, scaly, bipinnate; or pinnate, with the pinnæ pinnatifid; pinnæ small, distant, shaggy; rachis and slender stipes grooved and scaly; roots fibrous, densely matted. Northern Island, on exposed rocks.

GEN. XXXI.—LYGODIUM.

1. *L. articulatum*. Stem tough, wire-like, knotted and shining, climbing from tree to tree; barren fronds, perfectly smooth, dividing into stalked, strap-shaped, spreading, bright green pinnæ; fertile fronds with frequently dividing stalks terminating in numerous, small, crowded, spikes of fructification. Common in woods throughout the Islands.

GEN. XXXII.—SCHIZÆA.

1. *S. propinqua*. Frond resembling a long stalk, once or twice branched, rough to the touch, each branch terminating in a brown comb of fructification.

2. *S. bifida*. Frond not branched, smooth, otherwise resembling the last. Northern Island and north part of Middle Island.

3. *S. dichotoma*. Frond a span to 2 feet high, simple below, stiff; dividing above into narrow, linear segments, spread out like a fan, and each segment terminating in a small comb of fructification. Kauri forests.

GEN. XXXII.—LEPTOPTERIS.

1. *L. hymenophylloides*. Fronds 4 inches to 2½ feet high, springing from a stout, erect rhizome; bright green and translucent; pinnæ flat, finely cut, scarcely diminishing in size towards the base. As far south as Banks' Peninsula.

2. *L. superba*. To be distinguished from the former by its greater size and the gradually diminishing pinnæ, the frond being thus tapering at both ends; pinnæ thick and moss-like from the numerous fine, erect pinnules. Both this and the last fern lose their bright, fresh colour in drying. Mountainous parts of the Northern and throughout the Middle and Southern Islands.

GEN. XXXIV.—TODEA.

1. *T. Africana*. A very large, handsome, bi-pinnate fern; pinnules, joined to the rachis by a broad base, long, narrow, sharply notched; sori, masses of globose capsules, almost covering the pinnules; rachis smooth, light brown. Mount Camel. Hokianga.

GEN. XXXV.—MARATTIA.

1. *M. Salicina*. Rhizome a round, hard, fleshy mass (roasted and eaten by the natives), from which many tall fronds arise; fronds thick in texture, dark green, bi-tri-pinnate, 10-18 feet high; pinnules generally shortly-stalked, long and narrow, with notched margins; rachis stout, smooth, but in the young shoots both this and the stipes are scaly. Northern and Eastern parts of the Northern Island. Taranaki.

GEN. XXXVI.—OPHIOGLOSSUM.

1. *O. vulgatum*. Root of long, fleshy, fibres, sometimes descending from a tuberous rhizome; frond simple, erect, 1 inch to a foot long, bearing one simple, thick leaf, (rarely two); spike of fructification longer than the leaf.

Var. B. *costatum*. Frond oval and pointed above, or tapering at each end.

Var. C. *gramineum*. Frond oval or sharply pointed at both ends, costa and veins hidden.

Var. D. *lusitanicum*. Frond very narrow, and pointed at each end.

Var. E. *minimum*. Very small, 1-2 inches high.

Common in grassy places throughout the Islands.

GEN. XXXVII.—BOTRYCHIUM.

1. *B. Virginicum*. Frond solitary, 3 inches to 2 feet high, consisting of one succulent, tri-pinnate, leaf, and a long, erect, stalk, bearing a many-branched spike of capsules. Northern and Middle Islands, as far south as Canterbury, in open land.

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